



**U.S. Department of Energy**  
**Office of River Protection**

**P.O. Box 450**  
**Richland, Washington 99352**

02-OSR-0352

Mr. R. F. Naventi, Project Manager  
Bechtel National, Inc.  
3000 George Washington Way  
Richland, Washington 99352

Dear Mr. Naventi:

**CONTRACT NO. DE-AC-01RV14136 – INSPECTION REPORT IR-02-008 – ON-LOCATION INSPECTION REPORT FOR THE PERIOD MAY 24 THROUGH JULY 16, 2002, INCLUDING AN ASSESSMENT OF CONTRACTOR READINESS TO PERFORM PARTIAL CONSTRUCTION AUTHORIZATION ACTIVITIES**

Reference: BNI letter from R. F. Naventi to R. J. Schepens, ORP, "Low-Activity Waste 70°F Concrete Placement Root Cause Analysis and Corrective Action Plan," CCN-037826, dated July 30, 2002.

This letter forwards the results of the subject inspection of the Bechtel National, Inc. (BNI) waste treatment plant (WTP) construction performance for the period May 24 through July 16, 2002. Also, the results of a review of BNI's readiness to perform Partial Construction Authorization activities are included. The inspection identified two Findings, one with three examples, which are documented in the Notice of Finding (Enclosure 1).

Details of the inspection, including the Findings, are documented in the enclosed inspection report (Enclosure 2). The first Finding resulted from BNI staff's failure to follow procedures regarding (1) the requirement to apply a curing compound to the Low Activity Waste (LAW) basemat, (2) the failure to revise the design drawing for the C5 ventilation duct to reflect a change in the purchase order revising the material to be used to fabricate the duct, and (3) failure of the C5 shop drawing to reflect the material specification requirement listed in the purchase order. The second Finding regarded failure to install the C5 ventilation duct in accordance with the Safety Requirements Document (SRD) referenced codes and standards, or implement a revision to the SRD to reflect a change in the codes and standards specified on the design drawings. These Findings are of concern because they bring into question BNI's procurement and receipt inspection programs and reflect on the adequacy of BNI's efforts to ensure the WTP is being constructed in accordance with the approved design and authorization basis.

During this inspection period, BNI failed to adequately plan for and implement hot weather concrete placements. As a result, an unplanned cold joint occurred during the first LAW basemat concrete pour. Subsequently, BNI developed and implemented a recovery plan. The Office of River Protection (ORP) reviewed this plan and verified appropriate corrective actions were taken, and BNI recently resumed basemat concrete pours with good success. In addition to this event, a number of other events occurred that collectively raise concerns about the way BNI is

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constructing the WTP. These events include damage to a building T-4 electrical junction box; damage to the mobile Luffing crane; and failure to adequately control procurement of the C5 ventilation duct. In the reference letter, BNI committed to perform a common cause analysis of some of these events and will include developing lessons learned. The ORP acknowledges that BNI has taken a number of meaningful steps to address these events individually; however, BNI is encouraged to place high importance to identifying any common causes, to ensure appropriate corrective actions are identified to improve long-term performance.

You are requested to provide a written response to the Findings described above within 30 days, in accordance with the instructions provided in the Notice of Finding. If you have any questions, please contact me, or your staff may call R. C. Barr, Office of Safety Regulation, (509) 376-7851.

Sincerely,

Roy J. Schepens  
Manager

OSR:JWM

Enclosures (2)

cc w/encls:  
W. R. Spezialetti, BNI

## NOTICE OF FINDING

Section C.6, Standard 7, "Environment, Safety, Quality, and Health," of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defined the Contractor's responsibilities under the Contract as they related to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and quality assurance.

Standard 7, Section (d) of the Contract requires the Contractor to develop and implement an integrated, standards-based, safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained. The Contractor is required to conduct work in accordance with the Contractor developed and DOE approved Safety Requirements Document (SRD).

The Contractor's SRD was defined in 24590-WTP-SRD-ESH-01-001-02, Rev. 0, dated October 14, 2001.

Standard 7, Section (e)(2)(ii) of the Contract required the Contractor to comply with the specific nuclear regulations defined in the effective rules of the 10 CFR 800 series of nuclear requirements.

Title 10 of the Code of Federal Regulations, Part 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," required the Contractor to conduct work in accordance with the requirements of Subpart A and to develop a Quality Assurance (QA) Program that reflected the requirements of Subpart A.

The Contractor's QA Program was defined in 24590-WTP-QAM-QA-01-001, "Quality Assurance Manual," Rev. 0, dated August 2001 (QAM).

The QA Manual (QAM) contained the policies that established the QA requirements for the project. QAM Policy Q-02.1, "Quality Assurance Program," Section 1.1 stated "The QA Program is binding on all project personnel, including those responsible for planning and scheduling activities and external organizations working under the direct control of BNI." QAM Policy Q-02.1, Section 1.10 stated "Suppliers who provide items, parts, materials, consumables, and/or services that are within the scope of this program shall perform work to an appropriate QA program and implementing procedures."

The Contractor's QAM Policy Q-05.1, "Instructions, Procedures, and Drawings," Section 3.1.1, states "Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, and drawings of the type appropriate to the circumstances that include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished."

During the performance of an inspection of the River Protection Project Waste Treatment Plant (RPP-WTP) construction, conducted within the period May 24, 2002, through July 16, 2002, at the Contractor's offices and WTP construction site, the following items were identified:

- 1.a. Technical specification 24590-WTP-3PS-D000-T0001, *Engineering Specification for Concrete Work*, Rev. 0, Section 3.8, paragraph 3.8.4 requires the use of a curing compound to cure and protect concrete.

Contrary to the above, on July 11, 2002, the Contractor inadvertently used a form release agent to cure the finished portion of the Low Activity Waste (LAW) Pour #1 horizontal surfaces.

This is considered an example of a inspection Finding for failure to follow procedures as required in QAM, Policy Q-05.1, *Instructions, Procedures, and Drawings* (See IR-02-008, Section 1.8, IR-02-008-01a-FIN).

- 1.b. Purchase Order 24590-QL-POA-PP02-00010, *Embedded Stainless Steel Ducting*, Rev. 0, dated April 4, 2002, Section 2 (Technical Specifications), provided design drawing 24590-HLW-P3-P33T-00001 to the duct supplier. The design drawing, part 1 (Shop Materials), required part number 1 (duct) be pipe material conforming to American Society for Testing and Materials (ASTM) A-312, Grade 304L-SS, 0.375 inches wall thickness. Supplier Deviation Disposition Request (SDDR) SDDR-PROC-002-007, dated April 30, 2002, approved the substitution of A-240, 0.375 inch thick plate material for the drawing required A-312 pipe material. Procedure 24590-WTP-3DP-G04-00063, *Supplier Deviation Disposition Request*, Rev. 0, dated October 8, 2001, required, in Section 3.3, the discipline manager ensure revisions to affected documents are processed to support the SDDR disposition.

Contrary to the above requirements, as of June 17, 2002, the discipline manager failed to revise the drawing requirement to reflect the material type approved by the SDDR.

This is considered an example of an inspection Finding for failure to follow procedures as required in QAM Policy Q-05.1 (see IR-02-008, Section 1.12, IR-02-008-01b-FIN).

- 1.c. Purchase Order 24590-QL-POA-PP02-00010, *Embedded Stainless Steel Ducting*, Rev. 0, dated April 4, 2002, Section 2 (Technical Specifications), paragraph 6.1.c, required materials be identified by the applicable ASTM or American Society for Mechanical Engineers (ASME) material specifications on shop spool drawings.

Contrary to the above requirement, as of June 24, 2002, shop spool drawing C4658-M-007-2, Rev. 0, dated June 6, 2002, notes 1 through 4, only listed the type of material (A 304-L) and not the material specification (A 240).

This is considered an example of an inspection Finding for failure to follow procedures or instructions as required in QAM Policy Q-05.1 (see IR-02-008, Section 1.12, IR-02-008-01c-FIN).

2. Volume 2 of the SRD, Safety Criterion 4.4-8, requires conformance with ASME N509, *Nuclear Power Plant Air Cleaning Units and Components*, 1989 Edition.

ASME N509, Section 7.3 (Welding), required welding procedures, welders, and welding operators be qualified in accordance with American National Standards Institute (ANSI)/ASME AG-1, *Code on Nuclear Air and Gas Treatment*, 1988 Edition. ANSI/ASME AG-1, Section AA-6300, required qualification of welding procedures and welders in accordance with the most recent edition of the ASME Boiler and Pressure Vessel (B&PV) Code, Section IX (*Welding and Brazing Qualifications*).

Contrary to the above requirement, as of June 17, 2002, design drawing 24590-HLW-P3-P33T-00001, *HLW Vitrification Building Canister Handling-Embedded C5 Duct*, Rev. 0, dated March 8, 2002, required, in a note for general welding requirements, welding for fabrication and installation shall be in accordance with ASME B31.3, *Process Piping*, and the drawing. This design drawing failed to implement the Authorization Basis requirement (SRD), above, that welding for fabrication and installation shall be in accordance with ANSI/ASME AG-1.

This is considered an inspection Finding (see IR-02-008, Section 1.12, IR-02-008-02-FIN).

The Contractor is requested to provide, within 30 days of the date of the cover letter that transmitted this Notice, a reply to the Findings above. The reply should include: (1) admission or denial of the Findings, (2) the reason for the Findings, if admitted, and if denied, the reason why; (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further Findings, and (5) the date when full compliance with the applicable commitments in your authorization bases will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

U.S. DEPARTMENT OF ENERGY  
Office of River Protection

INSPECTION: On-location Inspection Report for the Period May 24 through July 16, 2002

REPORT NO: IR-02-008

FACILITY: Bechtel National, Inc.

LOCATION: 3000 George Washington Way  
Richland, Washington 99352

DATES: May 24, 2002 through July 16, 2002

INSPECTORS: J. McCormick-Barger, Sr. Regulatory Technical Advisor, Inspection Lead  
D. Kirsch, Consultant  
M. Evarts, Fluor Hanford Acceptance Inspector  
H. Doan, Fluor Hanford Acceptance Inspector  
J. Mohatt, Consultant

APPROVED BY: P. Carier, Verification and Confirmation Official  
Office of Safety Regulation

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## EXECUTIVE SUMMARY

On-location Inspection Report for Period of May 24 through July 16, 2002

Inspection Report Number IR-02-008

## INTRODUCTION

This inspection of Bechtel National, Inc. (the Contractor) construction activities covered the following specific areas:

- Review of the Contractor's Assessment of Partial Construction Authorization (PCA) Readiness (Section 1.2)
- Adequacy of the Contractor's Design Drawings Issued for Construction (Section 1.3)
- Adequacy of the Concrete Supplier's quality assurance (QA) and quality control (QC) Programs (Section 1.4)
- Adequacy of Concrete Production Preparations (Section 1.5)
- Adequacy of Consumable Material to Support Construction (Section 1.6)
- Backup Concrete Batch Plant Readiness (Section 1.7)
- Adequacy of Construction implementing Procedures and Observation of Construction Activities (Section 1.8)
- Adequacy of Personnel Training and Qualification (Section 1.9)
- Adequacy of Fire Protection Piping System Activities (Section 1.10)
- Adequacy of Programs and Procedures for Welding Activities (Section 1.11)
- Adequacy of High Level Waste (HLW) Basemat Ventilation Duct Fabrication and Installation Activities (Section 1.12)
- Adequacy of Industrial Health and Safety (IH&S) Oversight (Section 1.13)
- Adequacy of Closure of Inspection Items. (Section 1.14)

## Significant Observations and Conclusions:

- The Contractor's assessment of readiness to proceed with PCA structural concrete activities was adequate and provided a supportable basis for concluding the proposed construction activities could proceed. (Section 1.2)



- The design drawings necessary for installation of reinforcing steel, embeds, and concrete in the High Level Waste (HLW) and Low Activity Waste (LAW) building's elevator pits and LAW basemat placement LAW-0001 had been approved for construction. (Section 1.3)
- The concrete batch plant/production subcontractor had adequately implemented technical specification, QA manual, and implementing procedure requirements in the conduct of their activities, with a few minor exceptions corrected during the course of the inspection. (Section 1.5)
- The Contractor had assured sufficient concrete constituent materials, transportation units, and consolidation equipment, and qualified personnel were available to conduct the LAW basemat placement LAW-0001. (Section 1.6)
- The Contractor had assured the backup concrete batch plant had been certified as required by the ASTM requirements specified in SRD Safety Criteria 4.1-2. (Section 1.7)
- The material testing subcontractor procedures and test equipment conformed to applicable industry standard test requirements. (Section 1.8)
- The Construction Work Packages for the LAW north elevator and HLW northwest elevator pits contained the required information and the quality control (QC) inspections of the reinforcing steel were thorough and performed by knowledgeable staff. Concrete placements and material testing were conducted in accordance with procedure requirements. (Section 1.8)
- From review of the Contractor's readiness assessment, PCA design and construction drawings, applicable QA and QC programs, concrete mix design efforts, concrete batch plant qualification, concrete consumable materials and support resources, concrete production preparations, concrete testing provisions, construction implementing procedures, and the training and qualifications of staff assigned to perform PCA activities, the Office of River Protection concluded that the Contractor was ready to proceed with PCA activities. This conclusion was documented in a letter to the Contractor notifying them to proceed with PCA activities.<sup>1</sup> (Sections 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8)
- For the LAW basemat placement LAW-0001: the Construction Work Package was acceptable; the applicable drawings were current; the QC inspector was thorough in verifying reinforcement steel installation attributes; with the exception of hot weather concrete placement preparations, the Contractor had established and implemented an adequate planning process; the reinforcement installation was acceptable and in accordance with the established procedures, specifications, and drawings; qualified inspectors were performing QC inspection activities in a thorough manner and the inspection activities were adequately documented; the placement surface was clean and

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<sup>1</sup> ORP letter from R. J. Schepens to R. F. Naventi, BNI, "U.S. Department of Energy (DOE) Notice to Proceed with Partial Construction Activities," 02-OSR-0289, dated July 9, 2002.

free of debris and the rebar and mudmat had been properly dampened prior concrete placement; the limitations on concrete lift thickness and drop height were properly implemented; concrete consolidation was accomplished in accordance with specified requirements by an adequate number of crews using the proper equipment; the materials testing subcontractor procedures manual contained the most recent approved procedures, materials testing personnel were adequate in number and knowledgeable, and performed the required testing in accordance with the appropriate procedure and American Society for Testing and Materials (ASTM) standards; and the measuring and test equipment used to perform concrete testing had been calibrated and was within the required calibration period. (Section 1.8)

- The Contractor's preparations and plans for hot weather concrete placement were demonstrated to be inadequate as a result of the batch plant subcontractor's inability to maintain concrete temperature below the specified maximum of 70°F, later revised by Field Change Request to 75°F. The placement had to be terminated after about two thirds of the planned placement had been completed, resulting in an unplanned cold joint. (Section 1.8)
- Following termination of the LAW basemat pour, the Contractor applied an incorrect curing material. This was considered a Finding for failure to follow procedures (IR-02-008-01a-FIN). (Section 1.8)
- The concrete testing technicians, batch plant subcontractor QA and QC managers, and Contractor QC personnel were properly qualified to applicable requirements. (Section 1.9)
- The Contractor had accomplished hydrostatic testing of the firewater piping in accordance with established procedures and National Fire Protection Association (NFPA) 24 requirements. (Section 1.10)
- The Contractor's welding procedure specification and welder qualification records for welding the C5 ventilation duct conformed to necessary industry standard requirements. (Section 1.11)
- The design drawing for the HLW building C5 ventilation duct failed to implement the SRD requirements regarding the standard required for the qualification of welding procedures, welders, and welding operators. (Finding IR-02-008-02-FIN) (Section 1.12)
- The fit-up and completed weld for a C5 ventilation duct field weld conformed to applicable requirements. Weld filler metal had been issued in accordance with established requirements. The work package and special instructions provided the requirements and direction necessary to install the C5 ventilation duct. (Section 1.12)
- The engineering discipline manager failed to properly revise a design drawing to reflect an approved change in C5 duct material. (Finding IR-02-008-01b-FIN) (Section 1.12)

- A shop spool drawing did not identify the applicable ASTM or American Society of Mechanic Engineers (ASME) material specification, as required by the C5 duct purchase order. (Finding IR-02-008-01c-FIN) (Section 1.12)
- The QC receipt inspection for the C5 duct indicated a lack of attention to detail. The Material Receiving Report indicated the wrong material (did not reflect a change that occurred during manufacturing) and the inspector failed to identify weld preparations on the duct were nonconforming (field staff subsequently identified this condition on a non-compliance report). (Section 1.12)
- C5 duct welding was performed without using gas purges or grinding and back welding the inside surfaces of the welds. Failure to ensure a smooth surface inside the duct could result in radiological hot spots that may impact operations and decommissioning. An inspection follow-up item has been assigned to track the Office of Safety Regulation's (OSR's) review of the Contractor's ALARA evaluation of this welding practice (IR-02-008-03-IFI). (Section 1.12)
- The Contractor had acceptably implemented their program for industrial health and safety, except for a few minor observations, which were promptly and acceptably corrected during the inspection period. (Section 1.13)

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## **ON-LOCATION INSPECTION REPORT FOR PERIOD OF MAY 24 THROUGH JULY 16, 2002**

### **1.0 REPORT DETAILS**

#### **1.1 Introduction**

This inspection assessed the Contractor's performance of important-to-safety (ITS) and firewater construction activities in accordance with regulatory requirements, such as the Quality Assurance Manual (QAM), Safety Requirements Document (SRD), design documents, approved work procedures, and committed codes and standards. The inspectors also reviewed the Contractor's implementation of certain aspects of its Industrial Health and Safety (IH&S) program, including observing Contractor and subcontractor worker safety practices.

Details and conclusions regarding this inspection are described below.

#### **1.2 Adequacy of the Contractor's Assessment of PCA Readiness (Inspection Technical Procedure (ITP) I-135)**

##### **1.2.1 Inspection Scope**

The inspectors assessed the adequacy of the Contractor's assessment of readiness to perform Partial Construction Authorization (PCA) construction activities of manufacturing and placing concrete for the Low Activity Waste (LAW) and High Level Waste (HLW) basemats. The inspectors reviewed the Contractor's self-assessment reports and analysis of deviations between actual and expected readiness levels, and interviewed Contractor management and staff.

##### **1.2.2 Observations and Assessments**

On June 12, 2002, the Contractor notified the Office of River Protection (ORP) of its declaration of readiness to proceed with PCA activities.<sup>1</sup> Attached to the letter were the Contractor's lines of inquiry documenting the Contractor's assessment of readiness to proceed with construction work. The assessment included a review of a broad range of areas associated with the planned PCA activities. The lines of inquiry provided a means for the Contractor to ensure necessary activities were completed, or would be completed, before construction could begin. For example, the Contractor had identified fifteen open items, which were required to be completed before the requested PCA work activities could proceed. The Contractor was proceeding with completing and closing the incomplete items in a planned schedule appropriate for the items identified. The inspectors examined the scope, depth, and conclusions of the Contractor's assessment and found the assessment provided an adequate analysis of and basis for concluding readiness to proceed with PCA activities. Prior to commencing with PCA concrete pour

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<sup>1</sup> BNI letter from R. F. Naventi to W. J. Taylor, ORP, "Declaration of Readiness for Partial Construction Authorization Activities," CCN-034798, dated June 12, 2002.

activities, described in Section 1.8 of this inspection report, the Contractor completed the fifteen open items.

### **1.2.3 Conclusions**

The Contractor's assessment of readiness to proceed with partial construction activities was adequate and provided a supportable basis for concluding the proposed construction activities could proceed.

## **1.3 Adequacy of the Contractor's Design Drawings Issued for Construction (ITP I-135)**

### **1.3.1 Inspection Scope**

The inspectors examined a large number of Contractor's drawings associated with installing concrete in the HLW and LAW building's elevator pits and the LAW basemat placement LAW-0001 to ensure they had been approved for construction in accordance with QAM Policy Q-05.1, *Instructions, Procedures, and Drawings*.

### **1.3.2 Observations and Assessments**

The inspectors observed the drawings for installation of reinforcing steel and embeds in the HLW and LAW elevator pits and the LAW basemat scheduled for the first basemat concrete placement and verified they had been approved and issued for construction, as required by the Contractor's QAM and engineering procedures.

### **1.3.3 Conclusions**

The inspectors concluded the necessary design drawings for the elevator pits in the HLW and LAW buildings and the first concrete placement area of the LAW basemat had been approved and issued for construction.

## **1.4 Adequacy of the Concrete Supplier's QA and QC Programs (ITP I-135)**

### **1.4.1 Inspection Scope**

The inspectors examined the Central Pre-Mix Concrete Company (CPM) quality assurance program and implementing procedures to verify the requirements specified in these documents were being implemented as required.

### **1.4.2 Observations and Assessments**

The details and results of the inspectors' assessments of the CPM quality assurance program and implementing procedures have been summarized in Section 1.5 of this report.

### **1.4.3 Conclusions**

The inspectors' conclusions regarding the adequacy of the CPM quality assurance program and implementing procedures have been summarized in Section 1.5.3 of this report.

## **1.5 Adequacy of Concrete Production Preparations (ITP-I-113)**

### **1.5.1 Inspection Scope**

The inspectors examined the technical specification for furnishing and delivering concrete, the CPM Quality Assurance Manual (QAM), and the procedures implementing the QAM and concrete production requirements to assess whether these conformed to applicable technical specification and industry code and standard requirements. The inspectors selected several requirements from each of the examined documents and examined work activities and documentation to assess the degree of conformance to stated requirements.

### **1.5.2 Observations and Assessments**

The inspectors examined the following documents:

- 24590-WTP-3PS-DB01-T0001, *Engineering Specification for Furnishing and Delivering Ready-Mix Concrete*, Rev. 1, dated December 4, 2001
- 24590-QL-HC1-DB50-00001-16-03A, *Central Pre-Mix Concrete Co. NQA-1 Quality Assurance Manual for Hanford Nuclear Reservation*, Rev. 6, dated June 15, 2002
- 24590-QL-HC1-DB50-00001-25-07F, *Central Pre-Mix Concrete Company Procedures Manual*, Rev. 4, dated June 14, 2002.

The inspectors had reviewed and documented the acceptability of the concrete mix designs and concrete batch plant qualification in Office of Safety Regulation (OSR) Inspection Report IR-02-005, Sections 1.4 and 1.5, respectively.

The Contractor conducted an implementation audit of the CPM contract during the period of June 13 through June 18, 2002. Several issues had been identified requiring revision of the CPM Quality Assurance Manual (QAM) and Procedures Manual.

Following revision of the CPM QAM and Procedure Manual, to address the Contractor's implementation audit, the inspectors selected twelve requirements from the engineering



specification for verification of accomplishment by CPM. The inspectors examined documentation and interviewed Contractor and CPM staff members to assess whether the selected requirements had been accomplished. The inspectors concluded CPM had accomplished the implementation of all selected requirements, with the exception of those identified below.

- Paragraph 2.3.3 of the specification required, in part, "ASTM C 666 test results are required." The inspectors determined the required test results were not available because they related to testing air entrained concrete for resistance to rapid freezing and thawing, and the Contractor had not yet required a design mix for air entrained concrete. The concrete mix designs, accepted by the Contractor to date, had been for interior wall concrete and buried concrete, which would not be subject to freeze/thaw cycles. The Contractor revised the specification requirement, on June 16, 2002 (Field Change Request/Notice (FCR) 24590-WTP-FCR-C-02-058, Rev. 0), to specify the American Society for Testing and Materials (ASTM) C 666 test results were to be only required for air entrained concrete mix designs. The inspector concluded the FCR satisfactorily resolved this issue.
- Paragraph 2.5.6 of the specification required, in part, "Prior to initial shipment and use in construction, test all admixtures for compliance with the specified standards." CPM was not able to comply with the requirement because they did not have the capability to perform the required tests. Only the admixture suppliers, know the chemical formulations and have the capability of performing the required tests, and the suppliers each provided Certificates of Conformance attesting to the conformance of the specific admixture to the required ASTM standards. CPM documented this situation on nonconformance report number 5-09 and dispositioned the non-compliance report 'use-as-is' based on the certificates of conformance for the admixtures demonstrating conformance with the required ASTM standards. The Contractor revised the specification requirement, on June 19, 2002 (FCR 24590-WTP-FCR-C-02-060, Rev. 0), to specify the acceptability of the manufacturer's certificate of conformance in lieu of requiring CPM to perform testing. The inspectors concluded the FCR satisfactorily resolved this issue.
- Paragraph 3.3.2 of the specification required CPM, in part, to "Verify that the fineness modulus of the fine aggregate meets ASTM C 33 requirements based on the original mixture design requirements." ASTM C33, *Standard Specification for Concrete Aggregates*, 2002 Edition, required in Section 6.4 "For continuing shipments of fine aggregate from a given source, the fineness modulus shall not vary more than 0.20 from the base fineness modulus." The base fineness modulus for the source was established during the concrete mix design process as 2.84, which established a fineness modulus acceptance criteria of 2.64 to 3.04.

The inspector examined the fine aggregate gradation test data sheet used by CPM and observed the data sheet did not provide an acceptance criteria for the fineness modulus of fine aggregate. The inspector examined several fine aggregate gradation test documents and concluded the fineness modulus had never been outside the required acceptance criteria. CPM took immediate action to revise the fine aggregate gradation data sheet to

include the necessary acceptance criteria. CPM documented the discrepancy by nonconformance report number 5-10 and dispositioned the report 'use-as-is' based upon their finding, after review of the data sheets for material previously received, the fineness modulus' were within the required tolerance. The Contractor had conducted an implementation assessment of the CPM contract and found some discrepant issues, for which the Contractor wrote Corrective Action Report 24590-WTP-SCAR-QA-02-007, dated June 20, 2002. The Contractor included this inspector identified issue in the CAR for tracking to resolution. The CPM QAM, Section 5, required "Instructions, procedures and drawings shall include acceptance criteria when appropriate." This would be considered a Finding; however because this issue met the non-cited Finding criteria in Inspection Administrative Procedure A-105, "Inspection Performance," a Finding was not issued. Specifically, the issue was not programmatic, was entered into the Contractor's corrective action program, and the specific issue was corrected in a timely manner.

The inspectors concluded the Contractor's actions acceptably resolved the above issues.

The inspectors examined the CPM QAM and the records of approval by the Contractor, including an implementation audit (Audit Report number 24590-WTP-AR-QA-02-003, Rev. 0, dated June 27, 2002). The Contractor initially approved the QAM by letter on September 6, 2001. The inspectors examined the audit checklist and findings, and concluded all of the required quality assurance elements had been covered in an acceptable manner. The subcontractor was placed on the approved suppliers list with the stipulation the QA program needed to be revised to reflect necessary program elements regarding the audit program and auditor qualification. The inspectors examined the revised manual, approved by the Contractor on June 16, 2002, and concluded the QAM was much improved over earlier versions and defined an acceptable QA program. The inspectors selected sixteen requirements from the QAM for verification in the field. The inspectors concluded CPM had accomplished the implementation of all selected requirements, with the exception of those identified below.

- CPM QAM, Section 8 (*Identification and Control of Items*), paragraph 3.3, required certified mill test reports for each shipment of cement. However, CPM implementing procedure number 7 (*Unloading, Receiving Cement/Fly Ash*) required certified mill test reports for fly ash, in addition to cement. The inspectors concluded the implementing procedure was not consistent with the QAM requirement. The subcontractor revised the QAM to correct the oversight and include the requirement for fly ash certified mill test reports. The inspectors examined receiving inspection documentation and certified mill test reports for several shipments of fly ash and concluded the documentation correctly reflected conformance to applicable requirements.
- CPM QAM, Section 11 (*Test Control*), paragraph 3.3, required fine aggregate moisture content be tested before each daily concrete placement. The requirement, as stated, incorrectly omitted the requirement to test coarse aggregate for moisture content, as required by engineering specification 24590-WTP-3PS-DB01-T0001, Sections 3.2.6 and 3.3.1. The requirement to test fine and coarse aggregate daily at the start of concrete production was correctly implemented in the CPM implementing procedure 11 (*Testing of Sand and Aggregate Moistures*), Section 5.3. The inspectors concluded the QAM was

not consistent with the specification requirement or the implementing procedure requirement. The subcontractor revised the QAM to make the manual consistent with specification and implementing procedure requirements in this area. The inspectors examined records of moisture testing before previous (not important-to-safety) daily concrete productions and concluded the required fine and coarse aggregate moisture tests had been accomplished.

- The inspectors examined all of the CPM nonconformance reports generated to date and observed the form for nonconformance reporting used in practice, and provided by the QAM as Exhibit 4, did not provide for classification of the disposition (use-as-is, rework or reject). The inspectors further observed the Contractor was required to review and concur in any use-as-is or rework disposition provided by the subcontractor. All of the subcontractor nonconformance reports involved procedure implementation issues and did not involve nonconforming material; therefore, the classification of use-as-is, rework, or reject was not applicable. The subcontractor had devised a new form to include the requirement for assignment of a disposition; however, the new form had not yet been provided as Exhibit 4 of the QAM. After the inspectors discussed this issue with the Contractor and CPM, the subcontractor revised the QAM exhibit to provide the format to be used during the future. The inspectors observed the Contractor reviewed all of the subcontractor's nonconformance reports, providing assurance those with the proposed disposition of use-as-is or rework would be reviewed and accepted by the Contractor.

The inspectors concluded the subcontractor's actions acceptably resolved the above issues.

The inspectors examined *Central Pre-Mix Concrete Company Procedures Manual* to determine whether these implemented the requirements of the QAM and *Engineering Specification for Furnishing and Delivering Ready-Mix Concrete*. The Contractor had approved the procedures manual on June 16, 2002. The inspectors concluded the implementing procedures conformed to the requirements of the engineering specification and the CPM QAM, except for those areas identified and resolved above. The inspectors selected fifteen requirements of the implementing procedures for verification in the field. The inspectors concluded the subcontractor had acceptably implemented and accomplished all of the specified selected requirements.

### 1.5.3 Conclusions

The inspectors concluded:

- Based upon a sample of engineering specification requirements, CPM had implemented the specification requirements, with three exceptions, which were corrected during the inspection period.
- Based upon a sample of CPM QA Manual requirements, CPM had implemented the requirements of the QA Manual, with three exceptions, which were corrected during the inspection period.

- Based upon a review of the CPM procedures manual and the selection of a sample of requirements from the engineering specification and the QA Manual, the implementing procedures conformed to the requirements of the engineering specification and the QA Manual.
- Based upon the field verification of a sample of implementing procedure requirements, CPM had implemented and accomplished the specified requirements.

## **1.6 Adequacy of Consumable Material to Support Construction (ITP I-135)**

### **1.6.1 Inspection Scope**

The inspectors examined CPM materials in storage to determine whether the subcontractor had sufficient materials on hand to batch the first important-to-safety concrete placement and whether the Contractor had provided adequate equipment for accomplishing the placement.

### **1.6.2 Observations and Assessments**

The inspectors examined whether the Contractor had assured the concrete supplier had adequate materials in storage to complete the first important-to-safety (ITS) concrete placement in the LAW basemat. The inspectors found the Contractor had examined the inventories of consumables at the CPM facility and assured sufficient material was available. The inspectors examined receipt inspection documentation and the certified material test reports (CMTRs), test data, and Certificates of Conformance for the material (cement, admixtures, aggregate, fly ash, sand) planned for use in making concrete for the placement and concluded the documentation conformed to established requirements specified in CPM's QA Manual and procedures and demonstrated consumable material acceptability.

The inspectors further found the Contractor had considered the number of transportation units necessary to accomplish the smooth flow of concrete to the placement equipment and assured sufficient trucks were specified and planned. The inspectors also found the Contractor had adequately planned for, obtained, and tested a sufficient number of concrete consolidation vibrators to assure the concrete consolidation would keep up with the planned placement rate and the needed coverage.

The inspectors found the Contractor had assessed the personnel requirements to support the first ITS concrete placement and had identified the needed Field Engineers and QC inspectors by name and planned for their attendance at training sessions in preparation for the placement.

The inspectors found the Contractor had considered and assured sufficient numbers of materials testing subcontractor concrete testing personnel would be available to accomplish the required in process testing on the delivered concrete.

### **1.6.3 Conclusions**

The inspectors concluded for the first LAW basemat concrete placement, the Contractor had implemented a planning process to assure sufficient raw concrete constituent materials, concrete trucks, qualified concrete consolidation equipment, Field Engineering personnel, QC personnel, and material testing personnel were available.

## **1.7 Backup Concrete Batch Plant Readiness (ITP-I-113)**

### **1.7.1 Inspection Scope**

Safety Requirements Document (SRD), Safety Criteria (SC) 4.1-2, required conformance to American Concrete Institute (ACI) 349, *Code Requirements for Nuclear Safety Related Concrete Structures*, 2001 Edition. ACI 349, Section 3.8, required conformance to American Society of Testing and Materials (ASTM) C 94, *Standard Specification for Ready-Mixed Concrete*, 1994 Edition. The inspectors examined the Contractor's technical specification 24590-WTP-3PS-DB01-T0001, *Furnishing and Delivering Ready-Mix Concrete*, Rev. 1, dated December 4, 2001, and determined the Contractor's requirements regarding the qualification of the concrete batch plant conformed to the requirements of ASTM C 94.

The inspectors examined the National Ready-Mixed Concrete Association (NRMCA) checklist and certification for the backup concrete manufacturing batch plant at the WTP site to verify the batch plant was properly certified.

### **1.7.2 Observations and Assessments**

Section 3.2.3 of the Contractor's technical specification required conformance with ASTM C 94 for the batch plant and the plant conform to the NRMCA checklist certification requirements for batching and mixing equipment. The inspectors verified the NRMCA checklist and the batch plant certification had been completed by a registered professional engineer and the plant had been certified on April 30, 2002.

### **1.7.3 Conclusions**

The inspectors concluded the backup batch plant had been certified as required by the ASTM requirements specified in SRD Safety Criteria 4.1-2.

## **1.8 Adequacy of Construction Implementing Procedures and Observation of Construction Activities (ITP I-135, I-113)**

### **1.8.1 Inspection Scope**

The inspectors examined the Contractor's procedures and engineering technical specifications governing the performance of concrete manufacture and installation to determine whether the specified activities conformed to authorization basis and industry standard requirements. In addition, the inspectors examined selected concrete testing procedures, specified by the materials testing subcontractor, and the associated measuring and test equipment (M&TE) calibration records to determine whether the procedures and M&TE calibrations conformed to established American Society for Testing and Materials (ASTM) requirements. Further, the inspectors examined the conduct of concrete activities in the field to assess whether those activities had been conducted in accordance with program and procedure requirements.

### **1.8.2 Observations and Assessments**

The inspectors examined the following documents governing the installation and inspection of structural concrete:

- 24590-WTP-3PS-D000-T0001, *Engineering Specification for Concrete Work*, Rev. 0, dated December 3, 2001
- 24590-WTP-GPP-CON-3203A, *Concrete Operations (Including Supply)*, Rev. 0, dated June 13, 2002
- 24590-WTP-3PS-DB01-T0001, *Furnishing and Delivering Ready-Mixed Concrete*, Rev. 1, dated December 4, 2001
- 24590-QL-HC1-DB50-00001-16-03A, *Central Pre-Mix Concrete Co. NQA-1 Quality Assurance Manual for Hanford Nuclear Reservation*, Rev. 6, dated June 15, 2002
- 24590-QL-HC1-DB50-00001-25-07F, *Central Pre-Mix Concrete Company Procedures Manual*, Rev. 4, dated June 14, 2002.

The inspectors examined the *Engineering Specification For Concrete Work* and technical specification *Furnishing and Delivering Ready-Mixed Concrete*. The inspectors concluded the Contractor's specifications referenced the required Codes and Standards and contained appropriate requirements, implementing the necessary industry standards to perform the work.

The inspectors examined selected materials testing subcontractor concrete testing procedures governing tests for concrete temperature, slump, sampling air content, unit weight, and field fabrication and curing of concrete test cylinders. The inspectors compared the materials testing subcontractor procedures to the testing requirements of the applicable ASTM standard. The inspectors concluded the subcontractor procedures acceptably implemented the ASTM industry standard requirements.

In addition, the inspectors examined the materials testing subcontractor records of M&TE calibration, which would be utilized in the performance of the above testing activities and compared the records to the testing equipment requirements specified in the applicable ASTM standards. The inspectors concluded the subcontractor's M&TE records demonstrated conformance with accuracy and acceptance criteria established by the applicable ASTM.

The inspectors examined *Central Pre-Mix Concrete Company Procedures Manual* to determine whether the procedures implemented the requirements of the CPM QAM and engineering specification for *Furnishing and Delivering Ready-Mixed Concrete*. The inspectors concluded the implementing procedures conformed to the requirements of the engineering specification and the CPM QAM, except for those areas identified and resolved in Section 1.5.2 of this report.

The inspectors observed the concrete placement activities for the HLW tower crane base pedestal on June 21, 2002. Although the HLW tower crane base placement was not an important-to-safety activity, the Contractor planned to use this placement as a practice run for the first important-to-safety placement on the LAW building basemat.

The inspectors attended the Safety Talk Analysis Risk Reduction Talk (STAART) briefing and concluded the briefing was comprehensive and covered areas of safety in a satisfactory manner. The inspectors examined the following activities: final approval of the concrete pour card, concrete receipt activities, operation of the concrete Creter crane and pump, concrete consolidation, concrete testing activities, qualification of the materials testing subcontractor testing personnel, and calibration of the materials testing subcontractor test equipment. The inspectors observed the Contractor's Concrete Engineer, Concrete Superintendent, Field Engineer, and Quality Control Engineers performing their duties and concluded they conformed to the requirements of the Contractor's Concrete Operations procedure. The inspectors concluded the above activities conformed to applicable requirements.

The inspectors observed the Field Engineer performing the concrete truck receipt activities and observed the review of the batch ticket and the recording of the information required by the Concrete Work procedure, Section 5.3. The inspectors concluded these activities were performed in accordance with procedure requirements.

The inspectors observed the Contractor's concrete drop testing activities, which entailed briefly dropping concrete from a height of about 10 feet, and concluded the drop produced excessive segregation of the aggregate from the mortar. The Contractor had approved a brief conduct of such a test even though they recognized the ACI required a maximum of 5 feet of drop. The approximately 30 feet of drop from the Creter crane discharge to the bottom of the placement resulted in a high concrete velocity and when the mix impinged upon the rebar, excessive segregation occurred. The Contractor used a flimsy trunk extension, which was ripped and shredded within the first few yards of concrete placement, and was removed from the Creter crane discharge pipe. The removal of the trunk extension resulted in a short delay, during which some of the concrete placed earlier was starting to dry excessively, as evidenced by dry aggregate being visible. Continued concrete placement, however, was accomplished in time to avoid a cold joint. The consolidation activities conformed to the requirements of ACI 309, *Guide for Consolidation of Concrete*, 1996 Edition.

The inspectors examined the materials testing subcontractor procedure manual in use at the job site and found the manual contained the most recent procedures and the procedures had been approved for use and dated. The inspectors interviewed the two materials testing subcontractor test technicians and concluded they were knowledgeable of their procedures and test requirements. The inspectors examined the conduct of testing for concrete temperature, slump unit weight, density, and the filling and capping of concrete compressive test cylinders. The inspectors concluded the materials testing subcontractor technician performed the testing in accordance with their procedures and the applicable ASTM standards.

The inspectors examined Construction Work Packages LAW/C/C/0002, *Pour #1A North Elevator Pit, Elevation –27 TOC*, HLW/C/C/0009, *Pour # HLW-0009 North West Elevator Pit, Elevation – 27 TOC*, HLW/C/C/0010, *Pour # HLW-0010 South West Elevator Pit, Elevation – 27 TOC*, HLW/C/C/0011, *Pour # HLW-0011 South East Elevator Pit, Elevation –27 TOC*, and HLW/C/C/0001, *Pour #1 Foundation Mat #1 Elevation –31TOC*. The inspectors reviewed the contents of the work packages and concluded the required design documents and in process inspection reports were contained within the work packages. The Construction Work Packages for the HLW Elevator Pits did not contain in process inspection reports. The Contractor's QC explained to the inspectors, due to the accessibility of the work, if something was found to be incorrect, access would not be a problem. The inspectors concluded the process was acceptable to perform the work activities.

The inspectors interviewed the Contractor's Concrete Superintendent and the Concrete General Foreman to assess the depth and thoroughness of the planning process for the up coming HLW crane base placement. The superintendent explained his roles and responsibilities regarding the concrete placement, as well as the plans in the event of equipment breakdowns and batch plant failure. The inspectors were supplied with the Concrete Placement Planning Checklist the Contractor planned to use; this checklist was a planning tool to aid the Contractor in setting up the placement. The concrete general foreman explained his roles and responsibilities regarding the concrete placement, craft staffing, staging of equipment, and equipment breakdowns. The inspectors concluded the Contractor had established and implemented an adequate planning process.

The inspectors observed the concrete placements and testing activities for the LAW north elevator and HLW northwest corner elevator pits. The inspectors concluded the materials testing activities had been conducted as required by the materials testing subcontractor's procedures. The inspectors further concluded the concrete placements had been conducted in a quality manner in accordance with procedures. The inspectors observed, during the LAW placement, one consolidation crew periodically using poor vibrator handling techniques and brought the issue to the attention of the Contractor's QC staff observing the placement. The Contractor quickly corrected the crew and instructed them in the proper techniques for consolidating concrete. The crew performed properly after the correction. The consolidation of the HLW elevator pit was fully acceptable. The inspectors concluded the concrete in the elevator pits had been acceptably consolidated.

The inspectors examined the Contractor's LAW basemat reinforcement steel specifications and drawings, inspected LAW basemat work in progress, reviewed QC inspection activities, and



interviewed Craft and QC personal. The inspectors found no discrepancies or deviations from established requirements.

The inspectors examined Construction Work Package LAW/C/C/0001, *Pour 1, Basemat area*, governing the work. The inspectors reviewed the contents of the work package and concluded the required design documents and in process inspection reports were contained within the work package. The inspectors concluded the work package was acceptable to control and perform the work activities.

In preparation for a walk down of recently installed reinforcement steel, the inspectors reviewed a large number of applicable construction drawings obtained from the QC staff. Prior to the walk down, the inspectors compared the drawings to a Document Report from Project Document Control, which contained a revision status printed the day of the walk down. The inspectors concluded the drawings provided were the most current revision.

The inspectors witnessed an in-process inspection performed by a Contractor QC inspector on the LAW bottom basemat wall dowels on "15 line East Wall" and wall dowels on "L line South Wall, Pour 1 South East Quadrant," interior wall dowels, embed plates at the minus 21' elevation, lap splices, and reinforcing steel concrete clear cover. The inspectors also witnessed in-process inspections performed by a Contractor QC inspector on: the LAW North Elevator Pit top mat wall dowels on A line North wall; several embed plates at minus 27' elevation; the HLW North West, South West, and South East Elevator Pits at minus 27' elevation; and the Foundation Mat at minus 31' elevation, top and bottom mat reinforcement, wall dowels, and embed plates. The inspectors concluded the Contractor's QC inspector was thorough in verifying applicable reinforcement steel attributes, such as those listed above, and was knowledgeable regarding the requirements of applicable specifications. The inspectors performed a general inspection of the items identified above and found them acceptable. The inspectors identified no discrepancies with these items and concluded the inspections performed by the Contractor's QC were thorough and acceptable.

The inspectors interviewed the Contractor's QC lead to assess the depth and thoroughness of the QC planning process for LAW basemat placement LAW-0001. The lead discussed his role during the placement as well as the roles of the other QC inspectors who would be inspecting the placement. Areas discussed were batch plant inspection, concrete testing inspection, concrete discharge at the pump, and pour watch, among others. The lead also discussed experience of the QC personnel. The inspectors concluded the QC lead had established and implemented an adequate planning process.

The inspectors examined 24590-WTP-3PS-D000-T0001, *Engineering Specification For Concrete Work*, Rev. 0, dated December 3, 2001. The inspectors concluded the Contractor's specification referenced the required codes and standards and contained applicable installation requirements to perform the work.

In preparation for the LAW basemat placement (LAW-0001) the Contractor conducted a planning meeting, on July 10, 2002, to discuss the activities to accomplish the placement. The meeting was attended by the Contractor's staff responsible for the placement activities; however, there were no subcontractors in attendance. The field engineers responsible for the batch plant

and materials testing subcontractor activities were in attendance. There was a good discussion of the equipment planned for the placement and the capabilities of the equipment, traffic control and direction, the materials testing subcontractor testing locations, management of the testing frequency, and primary and backup batch plant operation. In response to questions regarding hot weather concrete preparations, the Contractor indicated the placement should be completed about noon and concentrated the discussion on the planning to preclude personnel disability due to heat exhaustion. There was minimal discussion of the technical aspects of hot weather concreting because a high level of confidence was placed on the batch plant water chillers and completing the placement at about noon on the next day, before the highest ambient temperatures would occur. The inspectors found the planning session was well attended and discussions focused on the right issues.

The LAW basemat placement was to begin at 5 a.m. on July 11, 2002; however the first truck was delayed until about 6:00 a.m. The inspectors examined the pour card and observed it had been completed satisfactorily; although the inspectors observed the Contractor's QA representative had identified the box identifying hot weather concrete placement was not checked-the Field Engineer checked the box immediately without considering the implications of the action. The Contractor's Concrete Operations procedure, Appendix 4, Section 1.4, item 10 (the actions necessary for checking the hot weather concrete placement box on the pour card), required the batch plant, testing personnel, placement crew, and post-placement crews be alerted to the need for special precautions to protect concrete from severe climate conditions. These issues had been discussed briefly at the planning session the previous day, as discussed above. The inspectors examined the placement cleanliness and preparation and found the placement was clean and free of debris, and the rebar and mudmat were properly dampened.

The inspectors observed the concrete placement activities and found the technical specification requirements for limiting the lift height to 2 feet or less and limiting concrete drop height to less than five feet were properly accomplished. The concrete consolidation techniques were implemented in accordance with specified requirements by a sufficient number of crews and equipment. The inspectors examined the Contractor's activities to monitor and limit form movement and found these to be thorough and well monitored. The inspectors examined the concrete receiving and testing activities at the Creter crane and concrete pump locations and found these had been conducted in accordance with specified ASTM and subcontractor procedure requirements. The inspectors verified the concrete M&TE had been calibrated as required by ASTM requirements and was within calibration intervals specified by the subcontractor's procedures. The Contractor effectively employed cooling fog in the vicinity of the placement.

The Creter crane spout became dislodged early in the placement and the repair resulted in a delay of about 20 minutes. The Contractor began to lose control of the concrete temperature and slump about two-thirds of the way through the placement and relaxed the maximum concrete temperature limits (required in *Engineering Specification for Concrete Work*) from 70°F to 75°F after a few truck loads of concrete had been rejected. The Contractor allowed this deviation via verbal direction from Engineering. NCR 24590-WTP-NCR-CON-02-092 was written to document this non-proceduralized method for deviating from an Engineering specifications. Another delay of about 40 minutes occurred when the batch plant emptied and recharged the cement silo and aggregate bins in an attempt to regain control of concrete temperature. The

placement continued, and after several more loads were rejected, it became clear the batch plant chillers were not adequate to cool the mix sufficiently to maintain less than 75°F. The Contractor terminated the placement activities about mid-afternoon and implemented the cold joint requirements of the Concrete Operations procedure. The inspectors concluded the Contractor had accomplished the activities related to the production, testing, and placement of the basemat concrete, with the exception of hot weather concrete placement preparations, in a quality manner. The events during the placement, and the delays amounting to about two hours total, demonstrated the Contractor's preparations and plans for hot weather concrete placement were inadequate.

The day following the termination of the LAW pour, the inspectors examined the container used as a curing compound for the completed portion of the concrete placement (LAW basement placement LAW-0001). The container was labeled *Symons – Thrift KOTE "E"*, a water based active form release agent. The inspectors spoke with the concrete general foreman to verify this material was what was placed on the finished concrete. The foreman concurred that it was.

Using a releasing agent in lieu of the required curing compound was not in conformance with the Contractor's technical specification for concrete. Technical specification 24590-WTP-3PS-D000-T0001, *Engineering Specification for Concrete Work*, Rev. 0, Section 3.8, paragraph 3.8.4 requires the use of a curing compound. Form release agent is not a curing compound. Since no curing compound was placed on the finished concrete until 7/12/02, at approximately 11:15 a.m., about 24 hours after the pour was completed, the curing process was indeterminate as well as the quality of the finished surface of the concrete. The Contractor generated Nonconformance Report 24590-WTP-NCR-CON-02-094 to document this condition. Failure to adhere to the above-discussed technical specification is an example of a Finding against the Contractor's QAM, Policy Q-05.1, *Instructions, Procedures, and Drawings*, for failure to follow procedures (IR-02-008-01a-FIN).

The Contractor cleaned the finished concrete, then applied *Resi Chem Clear, Type 1, Class B* curing compound, a water based curing compound.

### 1.8.3 Conclusions

The inspectors concluded the following:

- The materials testing subcontractor procedures and test equipment acceptably conformed to selected ASTM test requirements.
- The implementing CPM procedures conformed to the requirements of the engineering specification and the CPM QAM, except for those areas identified and resolved in Section 1.5.2 of this report.
- The Construction Work Packages for the LAW north elevator and HLW northwest elevator pits contained the required information and the QC inspections of the reinforcing steel were thorough and performed by knowledgeable staff. The concrete placements and material testing were conducted in accordance with procedure requirements.

- For the LAW basemat placement LAW-0001: the Construction Work Package was acceptable; the applicable drawings were current; the QC inspector was thorough in verifying reinforcement steel installation attributes; with the exception of hot weather concrete placement preparations, the Contractor had established and implemented an adequate planning process; the reinforcement installation was acceptable and in accordance with the established procedures, specifications, and drawings; qualified inspectors were performing QC inspection activities in a thorough manner and the inspection activities were adequately documented; the placement surface was clean and free of debris and the rebar and mudmat had been properly dampened prior concrete placement; the limitations on concrete lift thickness and drop height were properly implemented; concrete consolidation was accomplished in accordance with specified requirements by an adequate number of crews using the proper equipment; the materials testing subcontractor procedures manual contained the most recent approved procedures, materials testing personnel were adequate in number and knowledgeable, and performed the required testing in accordance with the appropriate procedure and ASTM standards, and the measuring and test equipment used to perform concrete testing had been calibrated and was within the required calibration period.
- The Contractor's preparations and plans for hot weather concreting were demonstrated to be inadequate as a result of the batch plant subcontractor's inability to maintain concrete temperature below the specified maximum of 70°F, later revised by Field Change Request to 75°F. The placement had to be terminated after about two thirds of the planned placement had been completed, resulting in an unplanned cold joint.
- Following termination of the LAW basemat pour, the Contractor applied an incorrect curing material. This was considered a Finding for failure to follow procedures (IR-02-008-01a-FIN).

## **1.9 Adequacy of Personnel Training and Qualification (ITP I-135, I-106)**

### **1.9.1 Inspection Scope**

The inspectors examined the documentation of training and qualification of Materials Testing subcontractor and CPM testing staff to determine whether the subcontractors' had accomplished the training and certification of personnel to support concrete testing activities, as required by Section 16.2 of ASTM C94, *Specification for Ready-Mixed Concrete*, 2000 Edition (required by SRD, Safety Criteria 4.1-2, see Section 1.7.2 above). In addition, the inspectors examined the training requirements and completion status of the Contractor's staff to support concrete installation and QC inspection.

### **1.9.2 Observations and Assessments**

Section 16.2 of ASTM C94 required personnel certified as American Concrete Institute (ACI) Concrete Field Testing Technician, Grade I, or equivalent to accomplish testing of concrete. The

inspectors examined the qualification records for nine materials testing subcontractor and four CPM concrete testing technicians and concluded the records examined demonstrated the required qualification levels. The inspectors examined the qualification documentation for the CPM Corporate and Hanford Quality Control Managers and concluded they conformed to requirements specified by the subcontractor's QAM.

The inspectors examined the qualification documentation for four Contractor QC personnel the Contractor planned to utilize for the inspection of the first ITS concrete placement in the LAW basemat and concluded three had been qualified as Level II inspectors, and one as a Level III inspector, in accordance with applicable Contractor procedure requirements.

### **1.9.3 Conclusions**

Based upon an examination of the qualification records of concrete testing technicians, the CPM QA and QC managers, and selected Contractor QC personnel, the inspectors concluded the records demonstrated qualification to specified requirements.

## **1.10 Adequacy of Fire Protection Piping System Work Activities (ITP-I-138)**

### **1.10.1 Inspection Scope**

The inspectors examined several hydrostatic test packages for conformance with SRD Safety Criteria specified in Volume II, Section 4.5, *Fire Protection*, requirements and observed the conduct of hydrostatic testing on several fire protection piping segments to determine whether the testing conformed to these requirements.

### **1.10.2 Observations and Assessments**

The inspectors examined the Contractor's test packages for four fire water piping hydrostatic tests and verified the proper test boundary was specified, valve line-ups were thorough, and required test parameters had been specified. The inspectors verified the calibrations of the pressure gauges were current, the appropriate calibration stickers were properly affixed, and the gauge range conformed to the requirements established by National Fire Protection Association (NFPA) 24, *Standard for the Installation of Private Fire Service Mains and their Appurtenance*. NFPA 24 is an implementing standard specified in Section 4.5, Volume II, of the SRD.

The inspectors observed the conduct of hydrostatic testing on portions of the fire water piping in Areas 13, 14, 15, 17, 19, 23, and 27 and verified the hydrostatic testing had been conducted in accordance with the Contractor's established requirements and NFPA 24, and the systems tested conformed to established requirements regarding leakage and time at pressure.

### **1.10.3 Conclusions**

The inspectors concluded the Contractor had accomplished hydrostatic testing of fire water piping systems in accordance with established requirements.

## **1.11 Adequacy of Programs and Procedures for Welding Activities (ITP-I-121)**

### **1.11.1 Inspection Scope**

The *Safety Requirements Document*, Volume II, 24590-WTP-SRD-ESH-01-001-02, Rev. 0, dated 10-4-01, paragraph 4.4-8, requires conformance with ASME N509, *Nuclear Power Plant Air-Cleaning Units and Components*, 1989 Edition. ASME N509, Section 7.3 (Welding) required welding procedures, welders, and welding operators be qualified in accordance with ANSI/ASME AG-1, *Code on Nuclear Air and Gas Treatment*, 1997 Edition. The inspectors examined the Contractor's welding program and procedures, related to welding on the C5 ventilation duct in the HLW building basemat, to determine whether these complied with ANSI/ASME AG-1 requirements.

### **1.11.2 Observations and Assessments**

The inspectors examined the Contractor's procedure for welding on the HLW building C5 duct (*Welding Procedure Specification P8-T*, Rev. 0, dated February 27, 2002) for conformance with AG-1, *Code on Nuclear Air and Gas Treatment*, 1997 Edition and ASME Section IX, *Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators*, 2001 Edition. The inspectors concluded the Contractor's welding specification implemented the AG-1 and ASME Section IX specific requirements for welding the C5 duct.

The inspectors examined the Contractor's welder qualification records for C5 duct welder stamps S-1, S-2, and S-3. The inspectors concluded the welder qualification records conformed to ASME Section IX requirements.

### **1.11.3 Conclusions**

The inspectors concluded the Contractor's welding specification implemented the AG-1 and ASME Section IX specific requirements for welding the C5 duct and the welder qualification records conformed to ASME Section IX requirements.

## **1.12 Adequacy of HLW Basemat Ventilation Duct Fabrication and Installation Activities (ITP-I-119)**

### **1.12.1 Inspection Scope**

The inspectors examined the Contractor's procurement, welding, and installation activities related to the C5 ventilation duct in the HLW building basemat to determine if these activities

complied with ANSI/ASME AG-1 requirements and applicable QAM and procedural requirements related to procurement and installation.

### 1.12.2 Observations and Assessments

ANSI/ASME AG-1, Section AA-6300, required qualification of welding procedures and welders in accordance with ASME Boiler and Pressure Vessel (B&PV) Code Section IX.

The inspectors examined drawing 24590-HLW-P3-P33T-00001, *HLW Vitrification Building Canister Handling – Embedded C5 Duct*, Rev. 0, dated March 8, 2002, and observed the drawing required, in a note for general welding requirements, welding for fabrication and installation shall be in accordance with ASME B31.3 and the drawing. The inspectors concluded this design drawing requirement failed to properly implement the requirement of the SRD, stated above, because conformance with ANSI/ASME AG-1 was not required as the fabrication and installation requirement. This is a Finding (IR-02-008-02-FIN).

The inspectors observed, however, the AG-1 code and ASME B31.3 code both require qualification of welding procedures and welders in accordance with ASME B&PV Code, Section IX.

The Contractor subsequently issued a Decision to Deviate (DTD) notifying the Office of River Protection of its intent to revise the SRD to allow the use of ASME B31.3 to weld the C5 ventilation duct. This DTD allowed the Contractor to continue to install the duct.

The inspectors examined the fit-up and completed weld for field weld (FW) number 4 on the C5 duct for conformance with ASME B31.3, Table 341.3.2, and the Contractor's welding procedure specification (WPS) P8-T. The inspectors concluded the Contractor had acceptably completed the fit-up and final weld in accordance with ASME B31.3 requirements.

The inspectors verified the Contractor's procedure for *Welding Filler Metal Control*, WFMC-2, Rev. 0, dated March 14, 2002, had been implemented during the issuing of filler metal. The inspectors concluded the Contractor had issued filler metal in accordance with procedure requirements.

The inspectors examined the Contractor's construction work package CWP-HLW-M-S-0001, dated May 2, 2002, and special instruction 24590-HLW-S1-M-02-0001, dated May 29, 2002. The inspectors concluded these documents implemented all the requirements necessary to install the C5 duct.

The inspectors reviewed the Contractor's Purchase Order 24590-QL-POA-PP02-00010, Rev. 0, dated April 4, 2002 (*Embedded Stainless Steel Ducting*). Based on this review, the following observations were made by the inspectors.

The Purchase Order, Section 2 (Technical Specification) provided drawing 24590-HLW-P3-P33T-00001 to the duct fabricator. The drawing required part number 1 (duct) be ASTM A312, Grade 304L-SS, 0.375 inches wall thickness material. The Contractor approved Supplier

Deviation Disposition Request (SDDR) number SDDR-PROC-002-007 on April 30, 2002. This SDDR approved the substitution of ASTM A-240, 3/8-inch thick plate, for A-312 pipe of 0.375-inch wall thickness. The inspectors concluded the Contractor's Engineering Department failed to revise the installation drawing material type as approved by the SDDR. Procedure 24590-WTP-3DP-G04B-00063, *Supplier Deviation Disposition Request*, Rev. 0, dated October 8, 2001, required, in Section 3.3, the Discipline Manager ensure revisions to affected documents are processed to support the SDDR disposition. The Discipline Manager failed to ensure the revision of the drawing requirement to reflect the SDDR material type. This is an example of a Finding against the Contractor's QAM, Policy Q-05.1, *Instructions, Procedures, and Drawings*, for failure to follow procedures (IR-02-008-01b-FIN).

The C5 duct purchase order, Section 2, paragraph 6.1.c, required materials be identified by the applicable ASTM or ASME material specifications on shop spool drawings. Shop spool drawing number C4658-M-007-2, Rev. 0, dated June 6, 2002, notes 1 through 4, only list the type of material (304 L) and not the material specification (A 240). This is an additional example of a Finding regarding failure to follow instructions or procedures regarding content of shop drawings (IR-02-008-01c-FIN).

The C5 duct purchase order, described above, required, in Section 2, paragraph 6.2.a, all materials shall be marked with the information required by the applicable ASTM or ASME material specification. ASTM A-240, *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*, 2002 Edition, paragraph 3.1, required conformance with Specification A-480. ASTM A-480, *Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip*, 2002 Edition, paragraph 2.5.1.1.2, required the material be marked with the specification designation number, type of steel, material identification number, and the name or mark of the manufacturer. The C5 duct purchase order, Section 2, paragraph 7.1.b, also required all welds be marked with the welders unique identification marks. The inspectors found a few sections of the installed C5 duct had not been marked as required, and a few welds on the installed C5 duct had not been marked as required. However, the Contractor was able to produce inspections records of Contractor vendor inspections indicating that the appropriate markings were on the material at the time of fabrication and that the material and welder identification information was transferred on to shop drawings and cross-referenced to each spool piece number before the markings were removed or covered up. This indicated that material type and welder identification was controlled.

The C5 duct purchase order, Section 2, paragraph 7.2, required field butt weld ends preparations shall be in accordance with ASME/ANSI B16.25, figure 2(a). ASME/ANSI B16.25, *Butt Welding Ends*, 1997 Edition, Figure 2(a), required weld end bevels of 37.5 degrees plus or minus 2.5 degrees. The QC inspector accepted the weld preparations on the Material Receiving Instruction (MRI) by accepting item 17. C (Verify Weld Preparations) on June 5, 2002. On June 18, 2002, the Contractor's field personnel identified that the weld end preparations were not as required and wrote Nonconformance Report 24590-WTP-NCR-CON-02-073, documenting the problem.

Work package CWP-HLW-M-S-0001, Special Instruction 24590-HLW-SI-M-02-0001, dated May 29, 2002, instructed QC inspectors to verify material through the purchase order. The



Contractor's QC inspectors stated they reviewed the Material Receiving Report (MRR) for material type and grade, as required by the special instruction, and verified the material was ASTM A312. However, the material was ASTM A 240 and not ASTM A 312. The MRR identified the material requirement as ASTM A 312 and did not reflect the material revision provided by SDDR # 1. The inspectors concluded (on July 10, 2002) the MRR failed to reflect the approved material revision (A 240) and not A 312. Although this error was relatively minor since the material received matched the purchase order requirement, this, along with the failure to identify the improper weld end bevel described above, was examples of the receiving inspector not demonstrating adequate attention-to-detail when reviewing the purchase order and the material received.

During review of the welding of the C5 ventilation duct, the inspectors noted the Contractor had opted to not use an argon gas purge during welding of the spool pieces. In addition, the Contractor did not grind out the inside of the welds and back weld to ensure smooth services. The inspectors noted the duct supplier had ground and back welded the shop welds prior to shipping them to the Contractor. The inspectors discussed with Contractor staff their concerns with installing C5 duct with oxidized interior weld surfaces. Specifically, the welds may provide locations for eventual radiological hot spots during operations and subsequent decommissioning. SRD Safety Criterion 8.0-2, states the facilities shall be designed to simplify decontamination and decommissioning, and reduce exposure to site personnel and the public during these activities. The Contractor indicated an ALARA analyses had been performed that concluded the weld procedures specified were adequate. Follow-up on the Contractors ALARA analyses will be reviewed during the ALARA Design Inspection, currently scheduled for November 2002. This review will be tacked as inspection follow-up item IR-02-008-03-IFI.

### 1.12.3 Conclusions

The inspectors concluded the following:

- The design drawing for the HLW building C5 ventilation duct failed to implement the SRD requirements regarding the standard required for the qualification of welding procedures, welders, and welding operators. This is considered a Finding. (Finding IR-02-008-02-FIN)
- The fit-up and completed weld for a field weld conformed to applicable requirements. Weld filler metal had been issued in accordance with established requirements. The work package and special instructions provided the requirements and direction necessary to install the C5 ventilation duct.
- The engineering discipline manager failed to ensure the design drawing reflected an approved change in C5 duct material. (Finding IR-02-008-01b-FIN)
- A shop spool drawing did not identify the applicable ASTM or ASME material specification, as required by the C5 duct purchase order. (Finding IR-02-008-01c-FIN)

- The QC receipt inspection for the C5 duct indicated a lack of attention to detail. The Material Receiving Report indicated the wrong material (did not reflect a change that occurred during manufacturing) and the inspector failed to identify the weld preparations on the duct were nonconforming; field staff subsequently identified this condition in a non-compliance report.
- C5 duct welding was performed without using gas purges or grinding and back welding the inside surfaces of the welds. Failure to ensure a smooth surface inside the duct could result in radiological hot spots that may impact operations and decommissioning. An inspection follow-up item has been assigned to track the Office of Safety Regulation's (OSR's) review of the Contractor's ALARA evaluation of this welding practice (IR-02-008-03-IFI).

### **1.13 Industrial Health and Safety (IH&S) Oversight (ITP-I-161)**

#### **1.13.1 Inspection Scope**

The inspections in this area focused on the Contractor's implementation of the Contract industrial health and safety requirements described in the Office of River Protection Manual (ORPM) M 440.1-2, *Industrial Hygiene and Safety Regulatory Plan for the Waste Treatment Plant Contractor*. Specifically, the inspectors assessed compliance to the requirements of the Contractor's *Non-Radiological Worker Safety and Health Plan*, PL-W375-IS00001, Rev. 1, dated March 12, 2001, for the River Protection Project-Waste Treatment Plant, which had been reviewed and approved by the Office of Safety Regulation (OSR), along with applicable requirements specified in ORP M 440.1-2. Areas reviewed included hand tool safety, electrical safety, operations involving the construction of forms, reinforcing steel, and embedments (FRE) and follow-on issues dealing with industrial hygiene sampling and monitoring. In addition, the inspectors reviewed an electrical arcing event, a boom damage event of a mobile track crane, and potential heat stress issues during hot weather concrete pours.

#### **1.13.2 Observations and Assessments**

The inspectors performed on site inspections of the industrial safety and health related activities associated with the FRE construction on the LAW, HLW, and the Pre-treatment (PT) building basemats.

Specifically, the inspectors evaluated hoisting and rigging activities, walking surfaces, and the handling and "tie up" of the rebar on the secondary mat at the LAW site. The inspectors also observed the application of the shotcrete at the PT facility and the placement of the tower crane base adjacent to the LAW site.

The inspectors inspected the East/West trench behind the T-1 facility, which was being used to provide sanitary waste disposal piping to the septic tank, and walked down the interior of the T-1 facility. The East/West trench was sloped properly and in accordance with the Contractor's excavation permit.

### 1.13.2.1 FRE Operations

The inspectors verified crane lifts were conducted in a safe manner. The ironworkers and other crafts were using the plywood walking surfaces on the upper level rebar mat in order to minimize the risk of twisted ankles and abrasions from wedged feet or legs. Further, the ironworkers were promptly tying down all rebar, in order to minimize unsure footing. The Contractor's dust control efforts had been improved in the excavation areas. The Contractor had provided eyewash stations within the excavation area. The Contractor demonstrated proactive efforts to ensure, where practical, younger flexible workers were assigned jobs below the upper level rebar mat.

The inspectors observed the mobile track crane's counterweight, at the LAW site, was properly barricaded in the normal operating position. However, when the crane had moved to make the lift for the mobile crane base, the barricade pinch point was unguarded. In accordance with the requirements (ORP M-440.1-2), the crane counterweight must be guarded at all times in order to minimize the risk of pinching or striking someone when it rotates. The inspector discussed this condition with the Contractor's Safety and Health Representative, and was informed it was the Contractor's intent to evaluate consistent crane counterweight protection at every location the crane was required to be set-up. The Contractor stated, in the future, the crane counterweight would be guarded or attended by personnel every time it was moved in order to prevent risk of injury.

The inspectors observed the Contractor had placed a retrieval/rescue "man basket" in the LAW and Pretreatment (PT) facility areas in order to accomplish quick extraction of any injured person working on or in the mat area.

The Contractor's Safety and Health Representative initiated immediate corrective actions after observing a subcontractor's unmanned, improper scaffolding used during anchor installation for fall protection.

The inspectors examined work in progress and discussed activities with personnel to assess the Contractor's conformance with the following requirements:

- 24590-WTP-GPP-SIND-024A, *General Safe Work Practice*, Rev. 0, May 8, 2002
- 24590-WTP-GPP-CON-3311, *Control of Temporary Electrical Installations*, Rev. 0, January 21, 2002
- 2450-WTP-GPP-SIND-008, *Lockout Tagout*, Rev. 1, October 1, 2001.

The inspectors concluded the Contractor was in conformance with the above procedures.

The inspectors observed a craft "tool-box" safety meeting at the LAW construction site. The meeting consisted of a selected craft person reading a one-page safety topic handout with the idea this would stimulate feedback or questions from co-workers. The foreman proceeded with the STARRT card meeting and verbally cautioned all workers of relevant risks and actions to be taken during the shift. The inspector also attended a toolbox safety meeting and STARRT card session held by the Operating Engineers foreman. The foreman and the Safety and Health

Representative discussed the topics of the week and some discussion and questions followed. Relevant issues related to the work of the day were discussed. The feedback from the employees focused on the means by which the crane operator could properly warn the personnel in the excavation when they were traversing a load in their area. The Contractor took appropriate action by issuing the workers a high decibel level whistle for use to warn co-workers when a load was being moved over their work areas. The inspectors considered the meetings had been relevant and timely, and the necessary amount of detail was provided to aid the workers in safely conducting work.

### 1.13.2.2 Electrical Safety

The inspectors examined the electrician's tool and parts area and met with the maintenance electrician foreman and the electrician shop steward. The inspectors determined Ground Fault Circuit Interrupters (GFCI), used on temporary wiring throughout the site, were inspected monthly by electricians as required by 24590-WTP-GPP-CON-3311, *Control of Temporary Electrical Installations*, Rev. 0, dated January 21, 2002. At the time of the inspection, two had been found unserviceable and had been destroyed by the electricians. The electricians were maintaining a logbook of GFCI inspections by location and condition. The inspectors observed two cut extension cords within the trailer; both cords were taken out of service and destroyed.

The electrician steward and foreman indicated they had found two GFCI "pig-tails" hooked in series and expressed concern regarding the installation adequacy. Regarding the use of multiple GFCI units on temporary power cords, the Contractor found no indication of any code violation or potential for a personal safety risk. The Contractor formally provided this feedback to their electrical foreman.

The procedure, 24590-WTP-GPP-CON-3311, *Control of Temporary Electrical Installations*, Rev. 0, January 21, 2002, required the user to make daily inspections of extension cords. However, the Contractor's Non-radiological Worker Safety and Health Plan (Section 6.3) required color-coding for "Assured Grounding Checks." This document required electricians to inspect extension cords and color-coding-not GFCI protection. The inspectors observed the directions within the construction procedure and the Contractor's safety and health plan were inconsistent. The inspectors determined the Contractor's use of GFCI protection was in conflict with color-coded assured grounding as required by 24590-WTP-PL-01-001, *Non Radiological Worker Safety and Health Plan*, Rev. 0. This conflict was in process of resolution by the Contractor through a change in the Non Radiological Worker Safety and Health Plan to reflect actual worksite procedure and site practice.

The inspector's interviewed the electrician General Foreman and determined the following:

- At the time of the inspection, the electrical system in use could be isolated at every point without risk of "back-feed"
- There was no anticipation of working on any energized system

- Disconnect switches had not yet been clearly marked as to the service they provided. The inspectors observed, on later inspections, the disconnect switches had been properly labeled.

The inspectors observed the main switchgear panel from the 13.8 KVA pole had been recently re-labeled and the outer doors of the panels had not been locked in order to prevent access to disconnecting switches. However, there were no energized parts accessible to unauthorized personnel and the interior enclosure was marked with a sign indicating the presence of energized components behind the enclosure. The inspectors found this installation met the requirements of 29 CFR 1926.408(a)(3)(ii).

The inspector met with the Contractor's tagging authority and reviewed the governing procedure, tagging logs, and permits, which had been issued. Further, the inspector walked down one of the tag and lock installations, which had been logged and assigned, on the main switching system with the tagging authority. Logs and permits reviewed were found to be in accordance with the Contractor's procedure.

The inspectors observed the work conditions and the storage practices in the electricians' fabrication area. The storage of electrical components was neat, orderly, and clean, showing evidence of frequent sweeping; housekeeping was good; and temporary electrical installations were in good condition. The inspectors observed 20 Amp GFCI breakers protected all circuits. The inspectors interviewed a few craft electricians and gave them the opportunity to express any safety concerns; no concerns were expressed.

The inspectors observed the setting of a pole, a part of a warning system, where the transmission lines crossed the perimeter road. The lift was orderly with proper traffic control. Contractor personnel used adequate tag lines and prescribed hand signals.

The inspectors observed locks and tags applied at several locations on the construction site and found them in conformance with procedure 24590-WTP-GPP-SIND-008, Rev. 1, *Lockout/Tagout*.

The inspectors examined the electrical installations and practices at the Central Pre-Mix Plant. The subcontractor utilized their own lockout/tagout procedure rather than the Contractor's procedure 24590-WTP-GPP-SIND-008, *Lockout/Tagout*. The procedure was adopted because of the routine frequency which lockouts were performed on the same pieces of equipment. For example, the QA technician was frequently required to lockout conveyors in order to take samples of sand and aggregate. The procedure conformed to the requirements of 29 CFR 1926.417 and provided protections equivalent to the Contractor's procedure. The Contractor's procedure for *Lockout/Tagout*, Section 3.2.2, required a job specific local plan be written when the requirements of the procedure could not be met. The Industrial Safety Manager and the Tagging Authority were required to approve the plan prior to work being performed. The inspectors verified, by reviewing documentation (the subcontractor plan), these requirements had been met.

### **1.13.2.3 Tool Safety**

The Contractor was in the process of consolidating and organizing their centralized tool facility. The inspectors observed some defective tools had been placed in the inventory bins and had not been tagged nor segregated as required by the Contractor's procedure. The inspectors notified the Contractor of the discrepancy and the Contractor corrected the situation. The Contractor met the procedure requirements by the time the inspectors left the facility. Discussions with craftsmen identified some electric hand tools would fail due to the dusty conditions and they (the workers) would cannibalize defective tool parts in order to repair a single tool to get it back into service. This was not in accordance with the Contractor's procedure, which required a "competent" person to repair defective tools before being placed back into service. The inspectors returned to the tool crib on June 23 and noted the broken and defective tools had been removed from the inventory bins, tagged and dated, and placed in shipping box for shipment to the marshalling area in accordance with the site procedure.

Tools used by the batch plant subcontractor were inspected and found to be in good condition and properly maintained and stored.

### **1.13.2.4 Fugitive Dust Sampling and Other Industrial Hygiene Sampling**

The inspectors reviewed the analytical results for the particulate sampling performed by the Contractor on May 29, 2002. The inspectors found the results, with the exception of a single anomaly, were below the American Conference of Governmental Industrial Hygienist's Time Weighted Average exposure limits for total particulate. The Contractor's Industrial Hygienist was in contact with the analytical laboratory to resolve the anomaly. The Contractor determined the one sample spike was inadvertently contaminated with heavy sand particles. The results had been made available to employees upon request.

The Contractor had made a verbal request of the drilling subcontractor to provide industrial hygiene sampling data on May 8, 2002. When the requested data was not forthcoming, the Contractor sent a letter to the subcontractor requesting the data on May 23, 2002. On June 19, 2002, the inspectors were informed the Contractor had not received any data from the subcontractor. The Contractor had previously instructed the subcontractor to initiate some additional controls in their drilling process until the sampling results were evaluated (i.e. conducting wet drilling.) Based upon verbal discussions between the Contractor and subcontractor and as witnessed by the inspectors, it was clear the requested controls had not been implemented by the subcontractor. The Contractor issued another request to the main subcontractor to initiate administrative drilling controls. As of June 23, the Contractor had received some sampling data from the subcontractor. However, the Contractor informed the inspectors the data was incomplete. The Contractor had proceeded to gather necessary sampling and monitoring data of the subcontractor's operation to ensure complete and adequate data collection. The drilling subcontractor did initiate wet drilling during the inspection in order to provide necessary protection for employees. The analytical sampling data had not been received by the Contractor. The Contractor's actions in this matter were consistent with the requirements of ORPM M 440.1-2.

### **1.13.2.5 Construction Management Safety Walkdowns**

Approximately every Thursday at 3:00 p.m., the Construction Manager, or his designee tours the construction site with representatives from craft workers, health and safety staff, construction superintendents, and a Department of Energy representative (either the Office of River Protection Site Representative or an Office of Safety Regulation inspector). During this inspection period, the inspectors accompanied this group on two occasions. During both walkdowns, the inspectors noted the group was self-critical of safety practices, identifying a number of relatively minor safety infractions. The items noted were documented on a walkdown report and actions were either taken immediately to address the infractions or address at a later date if longer term actions were warranted. The inspectors reviewed a copy of a previous walkdown report and noted documentation of timely and effective corrective actions to identified deficiencies. The walkdowns were a good initiative, demonstrating to Contractor employees, management commitment to worker safety.

### **1.13.2.6 Electrical Arcing Event and Damaged Junction Box at T-4 Facility**

The Contractor was in the process of connecting electrical service to the T-4 facility, on June 18, 2002, when the one of the splices failed within the junction box and shorted to ground. All personnel were clear of the junction box and the immediate operation when the splice failed. The failure caused a burn hole in the junction box. The inspectors interviewed electricians at the site and talked with the electrical superintendent. The Contractor completed an incident report, which the inspectors examined. The incident report provided the root causes of the incident and corrective actions including closure dates; all corrective actions had been completed. The completed closure items, resulting from the incident report, provided adequate mitigation to prevent a repeat of this type of incident. The Contractor had been in a hurry to provide electrical service for the facility and did not have the proper sized junction box available to perform the splice. On June 19, 2002, the properly sized junction box was received, the splice was performed, and the facility was placed into service with generator power.

The incident report identified several contributing causes to the arcing event, which included using the wrong junction box and the lack of following the site procedure 24590-WTP-GPP-CON-3311, *Control of Temporary Electrical Installations*, Rev. 0, January 21, 2002. The inspectors determined the corrective actions described in the report had been adequately closed.

### **1.13.2.7 Boom Damage on Mobile Track Crane in Luffing Configuration**

The inspectors were notified of boom damage to a mobile track crane in the luffing (tower like) configuration at the RPP-WTP site. The inspectors participated in several meeting with many Contractor personnel and observed the damage to the boom. The inspectors were informed personnel within the general vicinity of the damaged crane were removed promptly and a formal recovery plan was written and initiated the evening of the incident, July 1, 2002. The Contractor utilized another crane to provide controlled "booming down" of the luffing crane jib and mast. Upon completion of the safe "boom down" of the luffing crane, the Contractor issued stop operations notification on all conventionally configured mobile track cranes. They then, with the

manufacturer's representative, inspected the boom angle and boom stop set points on all of the conventionally equipped (non-luffing) cranes. Concurrently, the Contractor formed a formal accident investigation committee to thoroughly investigate the boom damage to the luffing crane and to develop root cause analysis and issues that needed to be identified and corrected to mitigate the risk of repeat damage. The inspectors were informed by the Contractor that preliminary information from the investigation indicated the luffing crane boomed up engaging the stops and continued to boom up at greater than 90 degrees until the stops were fully compressed and at which time the lower mast section buckled.

The inspectors observed the Contractor re-rig and reeve the damaged (luffing) crane in order to field check (under a controlled procedure and conditions) the limit switch operations for the boom angle. Preliminary results from that exercise indicated the luffing crane boom angle exceeded the specified limits prior to the limit switch activation. The Contractor's investigation committee had indicated, based upon thorough testing of the other conventional crane boom angle limit switch activations, the issue associated with the damage of the luffing crane was unique only to the luffing crane configuration. The Contractor concluded conventional mobile cranes could be safely placed back into service. Based upon a review of the data, the inspectors agreed with the Contractor's conclusion. The Contractor stated it would not place the luffing crane back into service until the root cause for the boom damage was identified and the necessary corrective action were closed.

The inspectors examined crane maintenance and training records for the mobile track cranes. Additionally, the inspectors interviewed the Contractor's rigging engineer, equipment manager, and rigging foreman. The results of the above indicated the luffing crane operator had successfully passed the Contractor's written and operational test for the luffing crane. The rigging engineer was asked why lifting plans were not included for the luffing crane work and he informed the inspector, until the luffing crane was to make a critical lift, a lift plan was not required. This response was in accordance with the Contractor's procedure. The rigging engineer assured the inspectors a lifting plan would be in place, before a luffing crane began to assist in the assembly of the tower crane.

Conclusions: The Contractor took appropriate measures in the recovery of the potentially serious situation in a methodical and disciplined manner. The Contractor is also investigating this serious incident with appropriate deliberations and intensity. Further, the Contractor's corporate personnel were onsite, assisting in the investigation.

#### **1.13.2.8 Potential Heat Stress Issues**

The inspectors visited the LAW work site on Thursday, July 11, 2002. The Contractor Safety and Health representative accompanied the inspectors. The inspectors reviewed the Pre Job Safety Plan and signed in. The laborers, cement finishers, and concrete subcontractor personnel were pouring and placing concrete on the LAW basemat. The day was very hot and the Contractor had provided a shaded watering and break area (in addition to the on-location watering points). A "platoon" system had been initiated for the Contractor's workforce whereby the working personnel on the mat were relieved by another rested crew at regular intervals.



Additionally, the Contractor provided "cool" neckbands and hardhat inserts, which were aiding in reducing the effect of heat.

According to ORP M440.1.2, the Contractor was required to follow the American Conference of Governmental Industrial Hygienists, Threshold Limit Values (TLV) to include physical agents-heat. The guidance recommended the employer evaluate the work load (metabolic rate) required for each job, sample the work environment for wet bulb/globe temperature (WBGT) index of heat, and then determine a work/rest schedule for the tasks based upon additional TLV guidance. The TLV is guidance in the commercial sector-not a regulation. However, in this case the Project had accepted the TLV as a required portion of the Contract.

Prior to this date, the inspectors had discussed plans for heat stress mitigation with the Contractor's Safety and Health representative. The Contractor had performed numerous WBGT monitoring readings throughout the site. Further, they had evaluated various jobs for workloads.

After further discussion with the Contractor Field Safety and Health Manager, the inspectors determined, on July 11, 2002, nine workers were seen by the plant nurse for heat related symptoms. Of the nine personnel, seven were ordered off the task by supervision and escorted to the nurse. The inspectors determined the nurse had not constituted any of the cases as being a recordable injury.

One issue, discovered by the Contractor, was several of the personnel who had involuntarily been escorted to the nurse had not eaten any lunch. The Contractor was concerned the lack of food may have contributed to their susceptibility to heat stress.

Conclusion: The Contractor had initiated proper evaluation and monitoring and had planned for the impact of the work and had utilized the guidance within the AGIH. The Contractor considered the affected workers who had skipped a meal, as troublesome for the maintenance of good employee work condition.

### **1.13.3 Conclusions**

The inspectors concluded, with the exception of a few minor instances, the Contractor had acceptably implemented the program for industrial health and safety. Identified discrepant conditions were promptly and acceptably corrected. The inspectors determined the Contractor had met the applicable requirements of ORP M 440.1-2.

## **1.14 Adequacy of Closure of Inspection Items (Inspection Administrative Procedures (IAP) A-105 and A-106)**

**1.14.1 (Closed 01-010-01-FIN)** Failure to provide adequate instructions in procedures for verifying loose fill lift thickness. During a previous inspection in this area, documented in inspection report IR-01-010, the OSR identified the Contractor had not provided adequate implementing procedures specifying the method to be employed in the field to verify loose fill

lift thickness conformed to established requirements nor implemented a process that addressed technical specification requirements in this area.

The inspectors had previously examined this issue and documented the results in inspection report IR-02-004, Section 1.4. This report documented the Contractor had placed the related subcontractor under the Contractor's Quality Assurance program, and developed revised procedures, specifications, and work packages to accomplish the backfill work. The Contractor had assigned a full-time field engineer and quality control inspector to ensure adequate controls of backfill activities were implemented.

The Contractor responded to the Finding by letter dated April 30, 2002.<sup>2</sup> The Contractor's initial response was found unacceptable by OSR and the reasons for unacceptability were identified to the Contractor by OSR letter dated May 3, 2002.<sup>3</sup> The Contractor responded with additional corrective actions by letter dated May 20, 2002.<sup>4</sup> The OSR found the Contractor's corrective actions identified in the May 20 letter acceptable and notified the Contractor of the acceptability by letter dated June 12, 2002.<sup>5</sup>

The inspectors verified several of the Contractor's specified corrective actions and examined backfill activities conducted subsequent to the initial observation of inadequacy and concluded the Contractor had adequately implemented the necessary corrective actions.

Based on the above, the inspectors determined the Contractor had adequately addressed this Finding and this item is closed.

**1.14.2 (Closed IR-02-009-01-IFI)** Contractor did not provide appropriate welding requirements for Supplier Deviation Disposition Request SDDR-PROC-002-007, regarding the change of material specified in purchase order PO 24590-QL-POA-PP02-00010. During review of the above listed SDDR, which allowed the supplier to use welded rolled stainless steel plate in lieu of stainless steel pipe for imbedded stainless steel ducting in the HLW C5 trench, inspectors from a recent procurement inspection (inspection report number IR-02-009) raised concerns about the SDDR lacking adequate information regarding weld requirements for the steel plate.

The inspectors reviewed purchase order (PO) PO 24590-QL-POA-PP02-00010, *Imbedded Stainless Steel Duct*, and determined it contained a requirement in Section 2, *Technical Specification*, Paragraph 7.0, *Fabrication*, requiring welding to be in accordance with ASME Section IX. The supplier was required to submit for Contractor review and approval the specific

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<sup>2</sup> BNI letter from A. R. Veirup to M. K. Barrett, ORP, "Bechtel National, Inc.'s Response to Geotechnical/Foundations, Firewater, and Industrial Health and Safety Inspection Report, IR-02-010," CCN-029091, dated April 30, 2002.

<sup>3</sup> ORP letter from R. C. Barr to R. F. Naventi, BNI, "Rejection of Bechtel Nationals Inc.'s Response to Findings from Geotechnical/Foundations, Firewater, and Industrial Health and Safety Inspection Report, IR-01-010," 02-OSR-0192, dated May 3, 2002.

<sup>4</sup> BNI letter from A. R. Veirup to M. K. Barrett, ORP, "Response to U.S. Department of Energy, Office of Safety Regulation Letter - Rejection of Bechtel Nationals Inc.'s Response to Findings from Geotechnical/Foundations, Firewater, and Industrial Health and Safety Inspection Report, IR-01-010," CCN-033347, dated May 20, 2002.

<sup>5</sup> ORP letter from R. C. Barr to R. F. Naventi, BNI, "Acceptance of Bechtel National Inc.'s Response to Geotechnical/Foundations, Firewater, and Industrial Health and Safety Inspection Report, IR-02-010, and Response to Request for Extension of Response to IR-02-004," 02-OSR-0256, dated June 12, 2002.

weld procedures and qualifications prior to fabrication of the duct. These procedures and qualifications were submitted and approved as required. The inspectors reviewed these procedures and qualification and determined they met the applicable ASME Section IX requirements.

Based on this review, this item is closed.

**1.14.3 (Closed 02-005-INR)** Occurrence Report No. RP—BNRP-RPPWTP-2002-0005, *Employee Terminated for Testing Positive During Routine Drug Test*. On May 30, 2002, A Bechtel direct hire ironworker working at the Hanford Tank Waste Treatment and Immobilization Plant construction site was terminated for testing positive for drugs. The Contractor reported this occurrence on May 30, 2002, and provided to the Department of Energy via the DOE Occurrence Report Processing System (ORPS) a Final Report on July 15, 2002.

On May 22, 2002, the employee had been selected to participate in a random test for drugs. During the test the employee provided a urine sample that was screened for controlled substances. The test indicated positive for controlled substance. The employee was notified of the test results, the employee's badge was confiscated, and the employee was escorted offsite. After the test results were confirmed by a certified laboratory, the results were sent to a certified medical review officer (MRO). The MRO confirmed the test results were accurate and on May 30, 2002, the positive test was reported to the employee and the employee's employment was terminated.

The Contractor had concluded the cause for this occurrence was human error. The Contractor stated the employee had attended the New Employee Orientation on April 15, 2002, which described the Contractor's drug and alcohol policy, had received a copy of the policy, and had signed forms acknowledging this policy. The employee had also passed an initial drug screening test prior to being hired. The Contractor concluded the employee failed to adhere to the conditions for employment regarding the use or possession of drugs. Other than terminating the employee's employment, the Contractor took no further corrective actions. The employee had been working on reinforcing steel for the HLW building basemat, an important-to-safety activity, construction aids, and temporary construction projects. Because the employee had not been empowered to accept HLW reinforcement steel work, and because the work the employee performed was being accepted by field engineering and quality control, the Contractor determined no additional verification of work performed was necessary.

The inspectors verified the employee had attended New Employee Orientation training by reviewing training records, verified the employee signed the acknowledgement statement regarding the alcohol and drug policy, and verified through records review he had passed the initial drug screening. The inspectors also reviewed 24590-WTP-G63-CON-1101A\_0, *Drug and Alcohol Screening for the WTP Construction Site*, dated October 22, 2001, and the *Jobsite Work Rules*, provided to the employee. These documents clearly described the Contractor's policy and rules regarding prohibition of alcohol and drugs onsite or being under the influence of alcohol or drugs while onsite.

Based on the above, the inspectors determined the Contractor adequately addressed this Occurrence Report and this item is closed.

## **2.0 EXIT MEETING SUMMARY**

The inspectors presented preliminary inspection results to members of Contractor management at an exit meeting on July 16, 2002. The Contractor acknowledged the observations and conclusions. The inspectors asked the Contractor whether any materials examined during the inspection should be considered limited rights data. The Contractor stated no limited rights data were examined during the inspection.

## **3.0 REPORT BACKGROUND INFORMATION**

### **3.1 Partial List of Persons Contacted**

R. Naventi, Project Manager  
F. Beranek, Manager ES&H  
D. Klein, Manager, Radiological, Nuclear, and Process Safety  
E. Hughes, Deputy Engineering Manager  
B. Niemi, Safety Program Engineer  
M. Ensminger, Quality Control Supervisor  
W. Clements, Site Manager  
R. Key, Subcontract Coordinator  
J. McDonald, Lead Civil Field Engineer  
J. McKenney, Concrete Superintendent  
C. Allen, CPM Hanford QC Manager  
T. Holt, CPM Project Manager  
J. Holt, CPM QC Technician  
S. Wittstock, CPM Corporate QC Manager  
D. Neal, QA Engineer  
F. Blanks, QC Engineer  
F. Boozer, Lead QC Engineer  
C. Wagner, Lead Civil Field Engineer  
L. Sullivan, Field Engineer  
B. Soderburg, Responsible Superintendent  
D Uldall, GN Northern Level I Testing Technician  
B. Pound, GN Northern Level I Testing Technician  
G. Nicklaus, QA Engineer  
M. Weaver, Lead Civil Field Engineer, LAW Building

### **3.2 List of Inspection Procedures Used**

Inspection Administrative Procedure A-105, "Inspection Performance"

Inspection Technical Procedure I-106, "Personnel Training and Qualification Assessment"

Inspection Technical Procedure I-113, "Structural Concrete Inspection"

Inspection Technical Procedure I-119, "HVAC Construction Inspection"

Inspection Technical Procedure I-121, "Piping Systems Construction Inspection"

Inspection Technical Procedure I-130, "Procurement Program Inspection"

Inspection Technical Procedure I-131, "Document Control and Records Management Program Inspection"

Inspection Technical Procedure I-135, "Readiness for Construction Inspection"

Inspection Technical Procedure I-138, "Inspection of Fire Protection System Inspection, Testing, and Maintenance"

Inspection Technical Procedure I-161, "Industrial Health and Safety Inspection"

### 3.3 List of Items Opened, Closed, and Discussed

#### Opened

IR-02-008-01a-FIN	Finding	Failure to apply the correct curing material to the completed portion of the LAW-0001 placement. (Section 1.8)
IR-02-008-01b-FIN	Finding	Failure to revise the engineering drawing when approving an SDDR to allow a change in C5 duct material. (Section 1.12)
IR-02-008-01c-FIN	Finding	Failure of the shop drawing to specify the appropriate material being used to fabricate C5 duct. (Section 1.12)
IR-02-008-02-FIN	Finding	Failure to install C5 ventilation duct in accordance with SRD or revise the SRD. (Section 1.12)
IR-02-008-03-IFI	Inspection Follow-up Item	Review the ALARA evaluation regarding the C5 duct welding without gas purge. (Section 1.12)

#### Closed

IR-01-010-01-FIN	Finding	Failure to provide adequate instructions in procedures for verifying loose fill lift thickness. (Section 1.14)
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IR-02-009-01-IFI	Inspection Follow-up Item	Contractor did not provide appropriate welding requirements for Supplier Deviation Disposition Request SDDR-PROC-002-007, regarding the change from purchase order PO 24590-QL-POA-PP02-00010. (Section 1.14)
02-005-INR	Incident Notification Report	Occurrence Report No. RP—BNRP-RPPWTP-2002-0005, <i>Employee Terminated for Testing Positive During Routine Drug Test.</i> (Section 1.14)

### Discussed

None

## **3.4 List of Acronyms**

AB	authorization basis
ACI	American Concrete Institute
AGHI	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Standard for Testing and Materials
B&PV	boiler and pressure vessel
BOF	Balance of Facilities
BNI	Bechtel National, Inc.
CFR	Code of Federal Regulation
CPM	Central Pre-Mix Concrete Company
DOE	U.S. Department of Energy
DR	Deficiency Report
DTD	decision to deviate
FRE	forms, reinforcing steel, and embedments
FW	field weld
GFCI	Ground Fault Circuit Interrupters
HLW	High Level Waste
IS&H	Industrial Safety and Health
IFI	Inspection Follow-up Item
IR	Inspection Report
ISMP	Integrated Safety Management Plan
ITS	important-to-safety
LAW	Low Activity Waste
LQI	List of Qualified Individuals
M&TE	Measuring and Test Equipment
MRO	medical review officer
NDE	Nondestructive Examination

NFPA	National Fire Protection Association
NRMCA	National Ready-Mixed Concrete Association
ONC	Onsite Notification Center
ORP	Office of River Protection
OSR	Office of Safety Regulation
PCA	Partial Construction Authorization
PT	Pretreatment
QA	quality assurance
QAM	Quality Assurance Manual
QC	quality control
RL	Richland Operations Office
RPP-WTP	River Protection Project Waste Treatment Plant
SDDR	Supplier Deviation Disposition Request
SRD	Safety Requirements Document
STARRT	Safety Task Analysis Risk Reduction Talk
TLV	Threshold Limit Values
TM	Training Manager
WBG	wet bulb/globe temperature
WPS	welding procedure specification